BrainLube!!!

Brain Publishing

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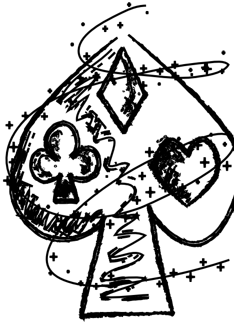
ISBN 0-9721784-2-2

For God

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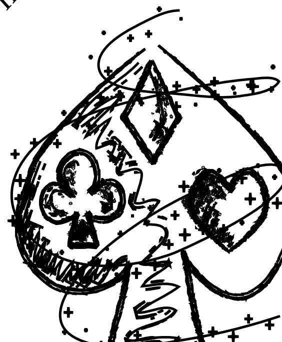
BrainLube!!!

Chapter 1



Card Tricks

Brain Lube



Question

On your travels you come to an old man on the side of the road holding three cards from a standard deck face down. Trying to make conversation you ask him what the three cards are. He tells you, ìTo the left of the queen, are one or two jacks. To the right of the jack, are one or two jacks. To the right of the club, are one or two diamonds. To the left of the diamond, are one or two diamonds.î
What are the three cards?

Hint

ìOne or two jacksî means that there are one or two jacks directly next to that card.

Answer

From left to right: the jack of clubs, jack of diamonds, and queen of diamonds.

Question

A man has four cards in his hand facing him, from 2 to 5. He wants them placed in ascending order from his left to his right. To do this, he takes the leftmost card (from your perspective) and puts it last. He then takes the third card from the right (your right) and puts it in last place. What was the previous order of the cards?

Answer

3, 5, 4, and 2, from his perspective.

Question

Two ladies played cards for candy; the winner received one piece per game from the loser. When it was time for one of the ladies to go home, one lady had won three games, while the other lady had won three new pieces of candy. How many individual games had they played?

Answer

They ended up playing nine games.

Question

In a two-deck chute, what is the least amount of cards you must take to be guaranteed a four of a kind of at least one rank? (4 of a kind could be of A, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, or K)

Answer

40 cards. 13 times 3 would be 39, the next card pulled would have to make four of a kind to some rank.

Chapter 2



Question

The bartender in a certain bar has two sizes of glasses, a three-pint size glass and a five-pint size glass. He has a customer come up to the bar and order four pints of beer. The bartender does not have a measuring cup, but he does have an endless supply of beer. How does he get exactly four pints of beer in the five-pint glass just by using the two glasses?

Hint

The three-pint and five-pint glasses are only marked on the 3-pint line and the 5-pint line (respectively), and that is their maximum capacity. Since there are no other markings on the glasses the bartender cannot estimate how much beer is in a glass just by freely pouring beer into it.

There are two ways to start measuring beer; one way saves beer and the other saves time. Either, start by filling the three-pint glass and pouring it into the five-pint glass, or filling the five pint glass and pour all that will fit into the three pint glass.



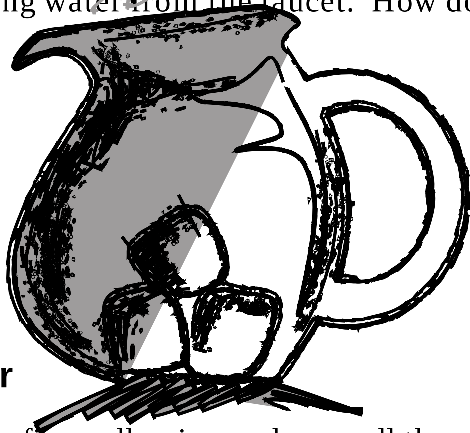
Answer

Fill the five-pint glass, then pour its contents into the three-pint glass (you now have two pints in the five-pint glass), pour out the three-pint glass, pour the two pints from the five-pint glass into the three-pint glass, then fill the five-pint glass. Fill the rest of the three-pint glass with the five-pint glass, and that leaves you with four pints in the five-pint glass.

Fill the three-pint glass. Then, pour its contents into the five-pint glass. Fill the three-pint glass again, and fill the rest of the five-pint glass with the three-pint glass. Pour out the five-pint glass, and pour the three-pint glass into the five-pint glass. Fill the three-pint glass, pour the three-pint glass into the five-pint glass, and that also leaves you with four pints of beer in the five-pint glass.

Question

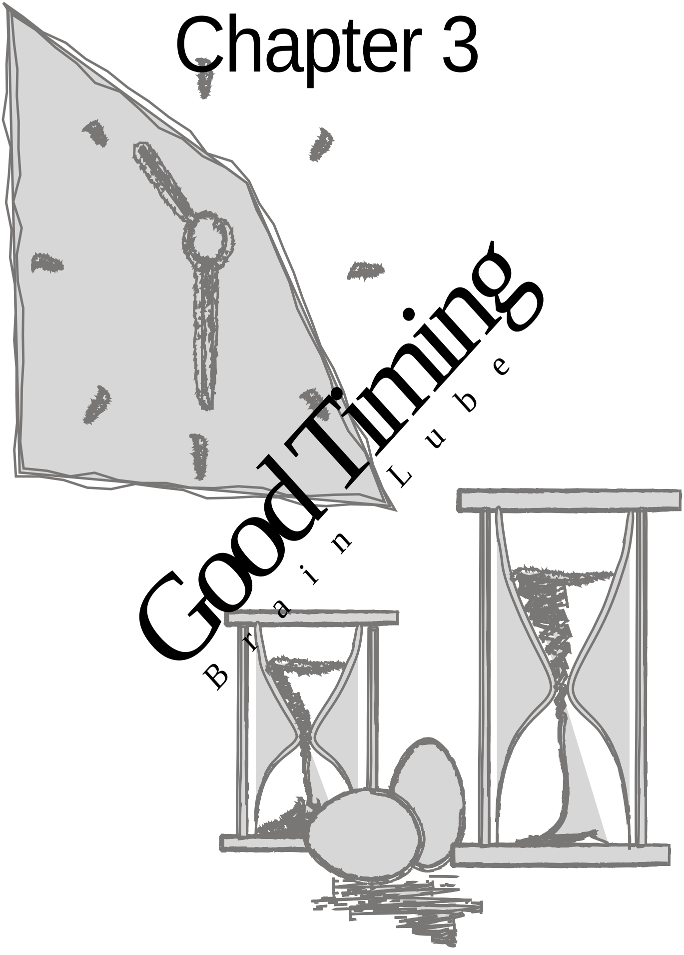
You have two jugs. One holds five gallons and one holds three gallons. There are no other jugs or containers available, and there are no markings on the jugs at hand. You need precisely seven gallons of drinking water from the faucet. How do you do it?



Answer

Fill the five-gallon jug and pour all the water that will fit into the three-gallon jug. This leaves you with two gallons in the five-gallon jug. Pour out the three-gallon jug, then pour the five-gallon jug into the three, fill the five and thatís exactly seven gallons of water.

Chapter 3

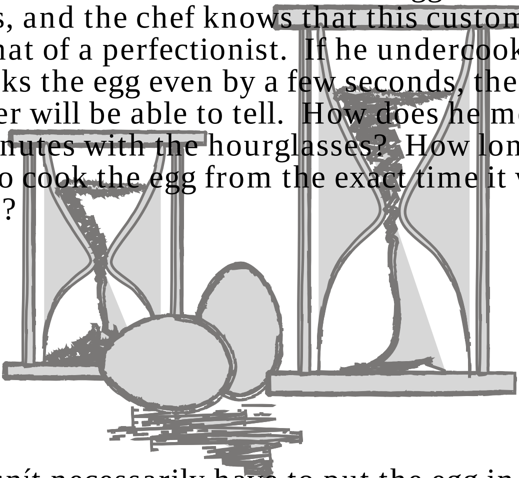


Good Timing

Brain Lube

Question

There is a chef in a town where ordinary clocks are illegal. He has no clocks or any other timekeeping devices, except for a four-minute sand-style hourglass and a seven-minute sand-style hourglass. On the chefís stove there is boiling water ready to be used. A customer asks the chef to boil an egg for nine minutes, and the chef knows that this customer is somewhat of a perfectionist. If he undercooks or overcooks the egg even by a few seconds, the customer will be able to tell. How does he measure nine minutes with the hourglasses? How long will it take to cook the egg from the exact time it was ordered?



Hint

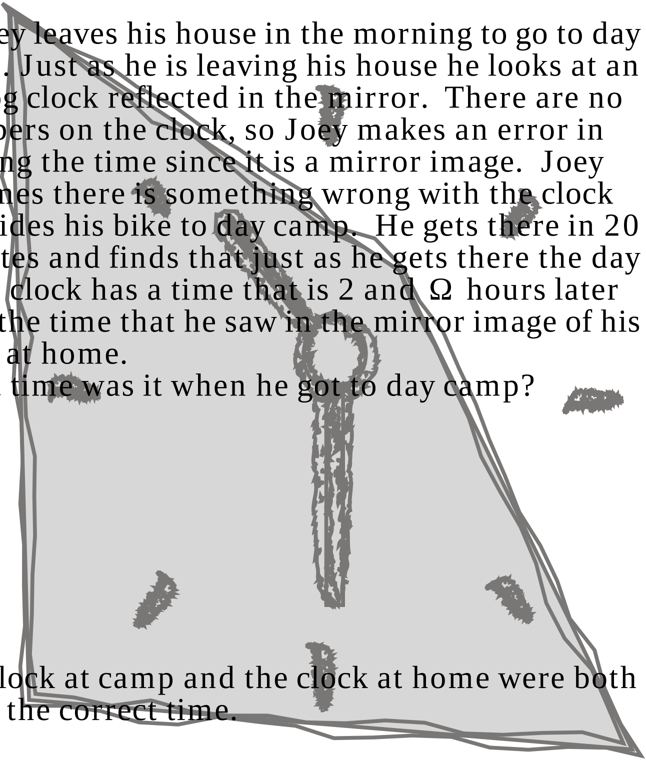
He doesnít necessarily have to put the egg in the water immediately.

Answer

When the egg is ordered, turn the four-minute glass and the seven-minute glass over at the same time. When the four-minute glass runs out you will have three minutes left in the seven-minute glass. Flip over the four-minute hourglass again and when the seven-minute glass runs out there will be one minute left in the four-minute glass. Flip the seven-minute glass again and when the four-minute glass runs out you will have six minutes left in the seven-minute glass, flip the four-minute glass over again and when the four-minute glass runs out you will have two minutes left in the seven-minute glass; put the egg immediately in the water. When the seven-minute glass runs out flip it again and when that runs out, your egg is done.

From the above method, it would take twenty minutes from the time the egg was ordered to the time it was done cooking.

Question



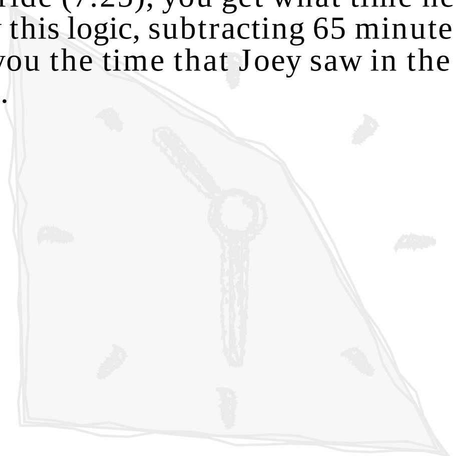
Joey leaves his house in the morning to go to day camp. Just as he is leaving his house he looks at an analog clock reflected in the mirror. There are no numbers on the clock, so Joey makes an error in reading the time since it is a mirror image. Joey assumes there is something wrong with the clock and rides his bike to day camp. He gets there in 20 minutes and finds that just as he gets there the day camp clock has a time that is 2 and Ω hours later than the time that he saw in the mirror image of his clock at home.
What time was it when he got to day camp?

Hint

The clock at camp and the clock at home were both set to the correct time.

Answer

Since both clocks were set to the same time, if you subtract 20 minutes from 2 Ω hours you will compensate for his 20 minute bike ride. Then divide that 2 hours and 10 minutes by 2 and this will give you the center-point (65 minutes) for compensating for the mirror. By adding
that 65 minutes to 6 oíclock (because we know that it is in the morning) you get the time he left home (7:05). Furthermore, by re-adding the 20 minutes from the ride (7:25), you get what time he got to camp. By this logic, subtracting 65 minutes for 6:00 will give you the time that Joey saw in the mirror at his house.

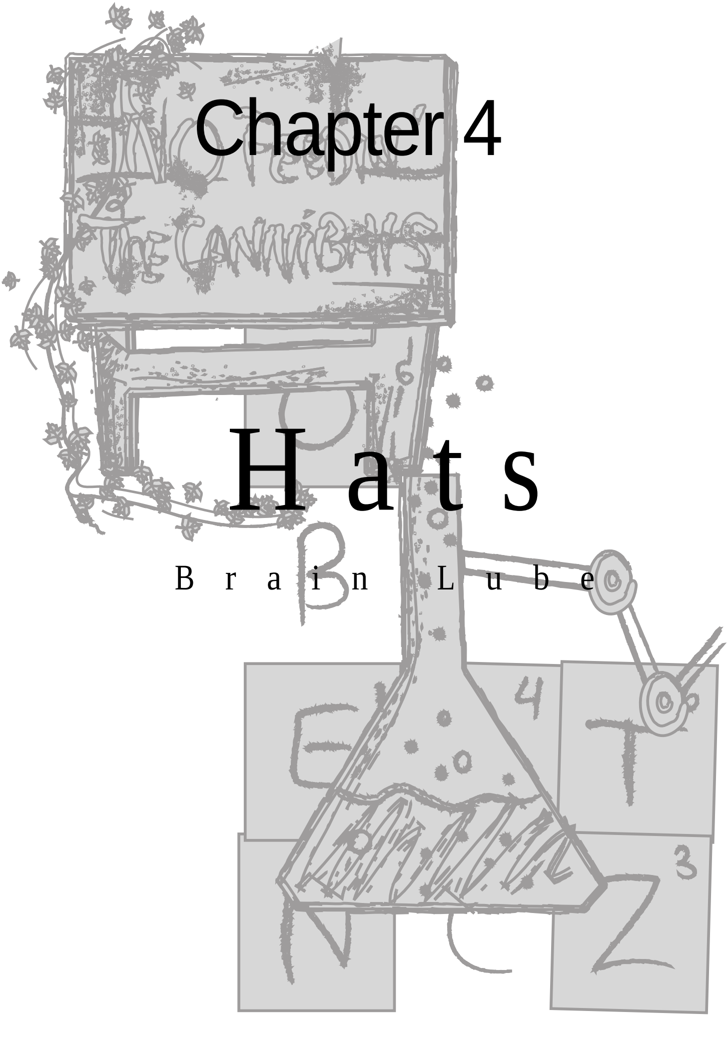


Question

In front of you are several long fuses. You know they burn for exactly one hour after you light them at one end. The entire fuse does not necessarily burn at a constant speed. For example, it might take five minutes to burn through half the fuse and fifty-five minutes to burn the other half. With your lighter and using these fuses, how can you measure exactly æ of an hour of time?

Answer

Fold one fuse and put another fuse next to it, light all three ends. When the fuse with both ends lit goes out, immediately light the other end of the lit fuse and lite a new fuse. When the second fuse goes out you will have æ an hour left burning on the third fuse.



Chapter 4

Hats

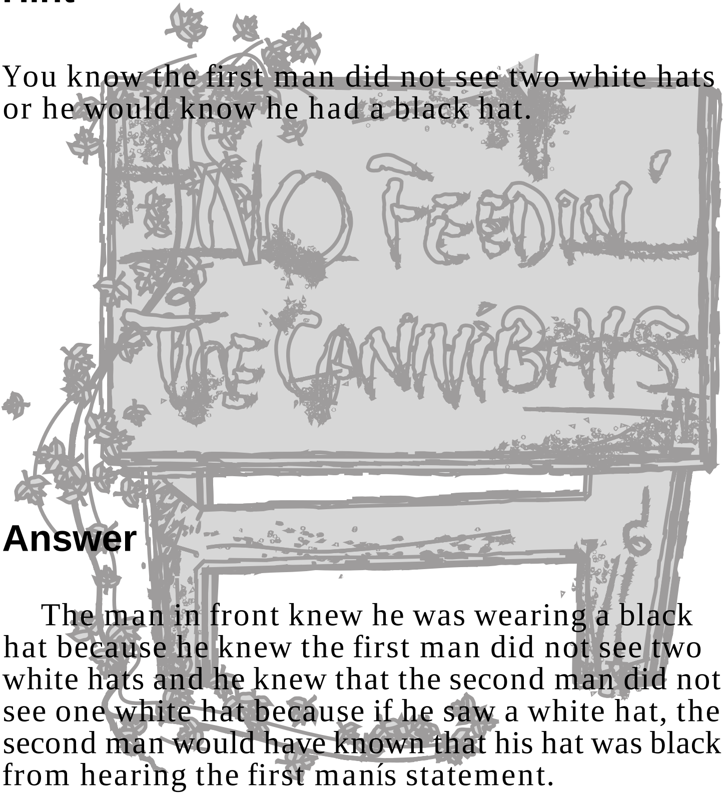
B r a i n L u b e

Question

Cannibals ambush a safari in the jungle and capture three men. The cannibals give the men a single chance to escape uneaten. The captives are lined up in order of height, and are tied to stakes. The man in the rear can see the backs of his two friends, the man in the middle can see the back the man in front, and the man in front cannot see anyone. The cannibals show the men five hats. Three of the hats are black and two of the hats are white. Blindfolds are then placed over each manís eyes and a hat is placed on each manís head. The two hats left over are hidden. The blindfolds are then removed and it is said to the men that if one of them can guess what color hat he is wearing they can all leave unharmed. The man in the rear who can see both of his friendsí hats but not his own says, ìI donít knowî. The middle man who can see the hat of the man in front, but not his own says, ìI donít knowî. The front man who cannot see ANYBODYíS hat says ìI know!î How did he know the color of his hat and what color was it?

Hint

You know the first man did not see two white hats or he would know he had a black hat.



Answer

The man in front knew he was wearing a black hat because he knew the first man did not see two white hats and he knew that the second man did not see one white hat because if he saw a white hat, the second man would have known that his hat was black from hearing the first manís statement.

Question

A scientist gathered four scholars. They were then lined up so that each one could see the people in front of her but not behind her. The scholar in the back could see the three scholars in front, and the scholar in front could not see anyone else. They were then told that there were four hats. ìThere is a red hat, a white hat, a blue hat, and a hat that is a duplicate of one of those colors,î the scientist said. A hat was placed on the head of each scholar, and none of the scholars could see the color of the hat that she was wearing. Starting with the girl in the back, each scholar was asked what color hat she was wearing. They all gave the correct answer. What was the arrangement of the hats that made this possible? (Since the colors are arbitrary, just tell which two of the scholars were wearing hats of the same color).

Hint

The middle two are not wearing the same colors.

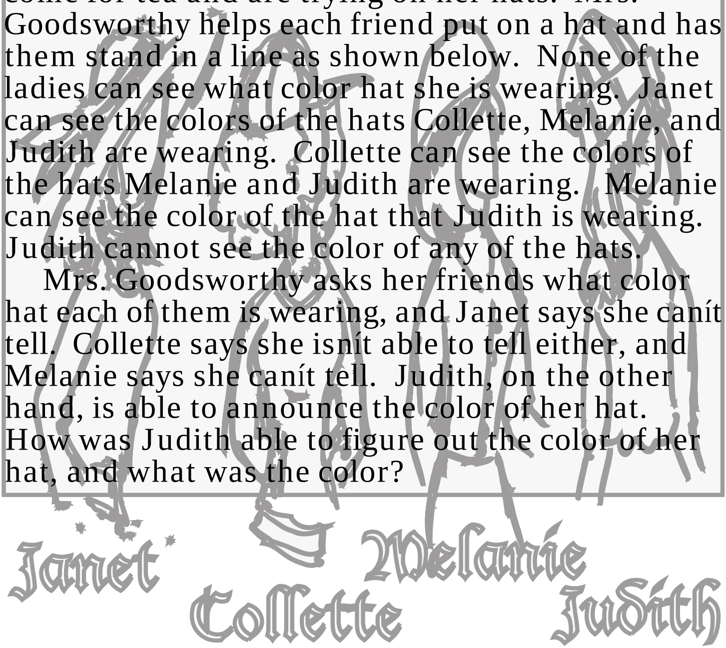
Answer

The two front people are wearing the same hats; this is the only way all of the scholars could know what color hat they were wearing.

Question

Mrs. Goodsworthy has 6 gorgeous hats. 3 are green, 2 are blue, and 1 is canary yellow. Four of her friends, Janet, Collette, Melanie, and Judith have come for tea and are trying on her hats. Mrs. Goodsworthy helps each friend put on a hat and has them stand in a line as shown below. None of the ladies can see what color hat she is wearing. Janet can see the colors of the hats Collette, Melanie, and Judith are wearing. Collette can see the colors of the hats Melanie and Judith are wearing. Melanie can see the color of the hat that Judith is wearing. Judith cannot see the color of any of the hats.

Mrs. Goodsworthy asks her friends what color hat each of them is wearing, and Janet says she canít tell. Collette says she isnít able to tell either, and Melanie says she canít tell. Judith, on the other hand, is able to announce the color of her hat. How was Judith able to figure out the color of her hat, and what was the color?



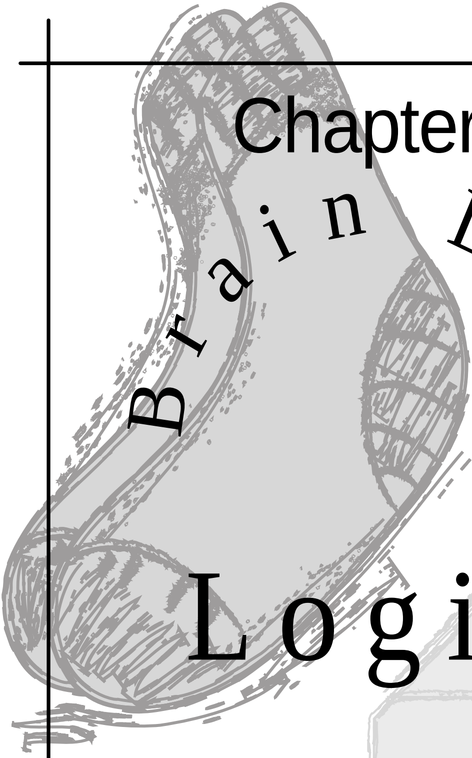
Answer

The color of Judithís hat was blue. If Judithís hat were any other color, then Melanie would have figured out what she herself was wearing.

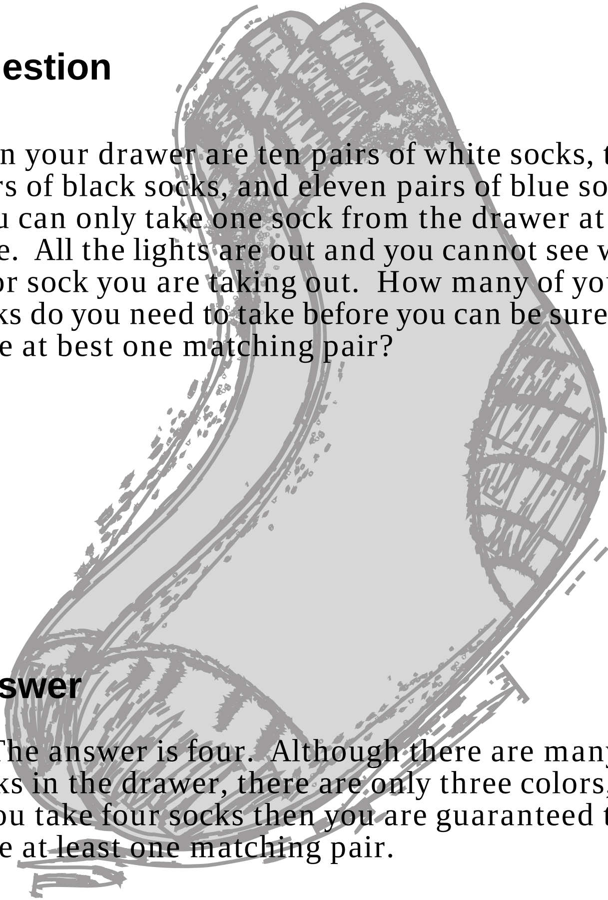
Chapter 5

Brain Lube

Logic







Question

In your drawer are ten pairs of white socks, ten pairs of black socks, and eleven pairs of blue socks. You can only take one sock from the drawer at a time. All the lights are out and you cannot see what color sock you are taking out. How many of your socks do you need to take before you can be sure you have at best one matching pair?

Answer

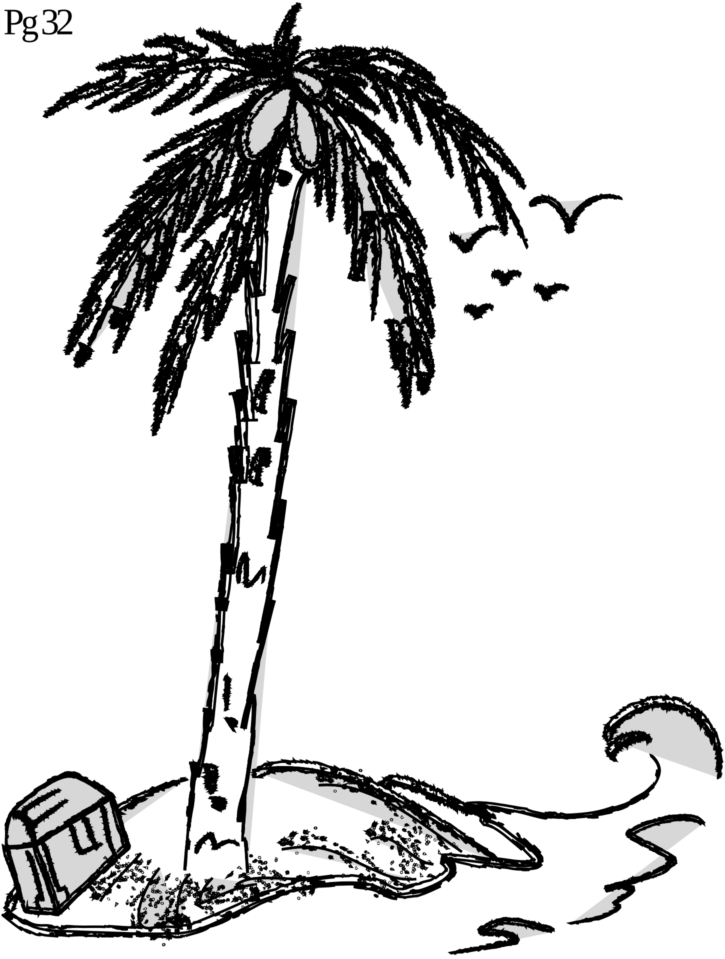
The answer is four. Although there are many socks in the drawer, there are only three colors, so if you take four socks then you are guaranteed to have at least one matching pair.

Question

You are on an island and there are three crates of fruit that have washed up in front of you. One crate contains only apples. One crate contains only oranges. The other crate contains both apples and oranges. Each crate is labeled. One reads ìapplesî, one reads ìorangesî, and one reads ìapples and orangesî. You know that NONE of the crates have been labeled correctly. If you can only take out and look at just one of the pieces of fruit from just one of the crates, how can you label ALL of the crates correctly?

Answer

Take a piece of fruit from the ìapples and orangesî crate. If itís an apple then you know that is the ìapplesî crate since ALL THE CRATES ARE LABLED INCORRECTLY. This means the crate marked ìapplesî must be ìorangesî and the crate marked ìorangesî must be ìapples and orangesî.



Chapter 5 Logic

Einsteinís Question

The master of visual-thinking himself came up with this one.

Einsteinís Riddle was as follows:
There are five houses in five different colors in a row. In each house lives a person with a different nationality. The five owners drink a certain type of beverage, smoke a certain brand of cigar, and keep a certain pet. No owners have the same pet, smoke the same brand of cigar, or drink the same beverage. Other facts:
1. The Brit lives in the red house.
2. The Swede keeps dogs as pets.
3. The Dane drinks tea.
4. The green house is on the immediate left of the white house.
5. The green houseís owner drinks coffee.
6. The owner who smokes Pall Mall rears birds.
7. The owner of the yellow house smokes Dunhill.
8. The owner living in the center house drinks milk.
9. The Norwegian lives in the first house.
10. The owner who smokes Blends lives next to the one who keeps cats.
11. The owner who keeps the horse lives next to the one who smokes Dunhill.

Einsteinís Question

12. The owner who smokes Bluemasters drinks beer.
13. The German smokes Prince.
14. The Norwegian lives next to the blue house.
15. The owner who smokes Blends lives next to the one who drinks water.

Who owns the fish?



Answer

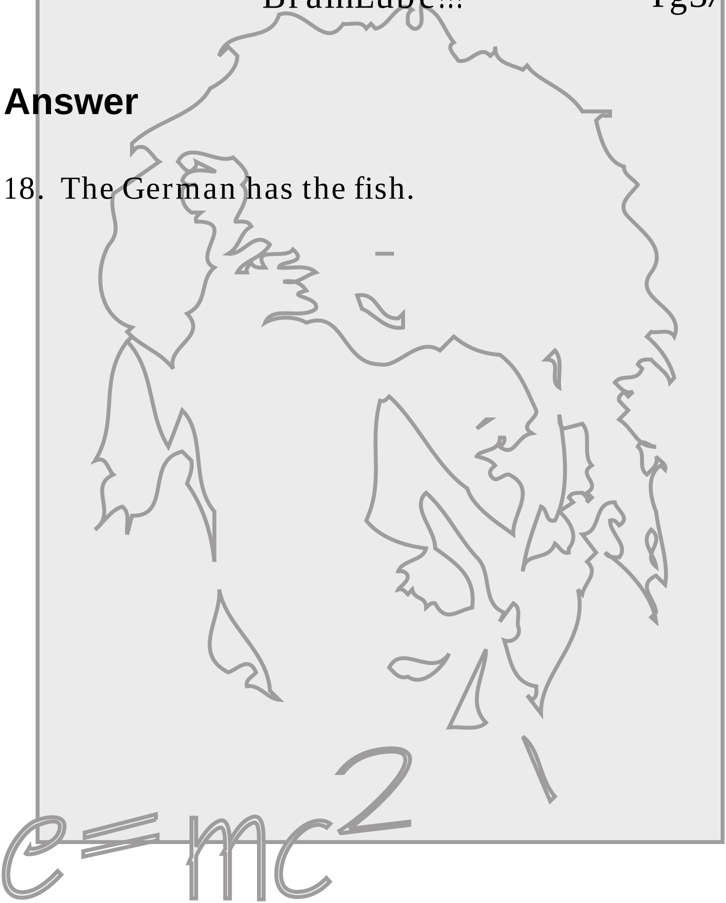
1. The Norwegian lives in the first house as stated in clue #9.
2. The 2nd house is blue - stated in clue #14.
3. The owner of the center house drinks milk - clue #8.
4. The green house is to the left of the white house - #4, which means it is to the right of the center house, because...
5. The green house's owner drinks coffee as stated in #5.
6. The Brit lives in the red house - clue #1, which means he lives in the center
house because the Norwegian lives in the 1st house and the only color left is yellow for the 1st house.
7. The owner of the yellow house smokes Dunhill - clue #7, and...
8. Lives next to the owner who keeps the horse ñ clue #11.
9. The horse owner lives in the blue house because he lives next to the yellow house ñ clue #11.
10. The Norwegian smokes Dunhill because he lives in the yellow house - clue #7.

Answer

11. The owner who smokes Blends lives next to the Norwegian because the only 2 owners he could have been were blue or white, and white
is next to the coffee drinker ñ clue #15. That means that the Norwegian drinks water, because the Brit drinks milk.
12. The owner of the white house smokes Bluemasters and drinks beer - clue #12 because he is the only one not listed for a brand of smokes or a drink (Dunhill, Blends, milk, coffee).
13. The Dane lives in the blue house because all the drinks are taken and the Dane drinks tea ñ clue #3.
14. The German lives in the green house and smokes Prince, the only brand left ñ clue #13.
15. The Swede lives in the white house, has dogs ñ clue #2, and drinks beer.
16. The Brit smokes Pall Mall, the only smoke left, and rears birds ñ clue #6.
17. The owner who smokes Blends is the Dane who lives next to the one who keeps cats -- the Norwegian ñ clue #10.

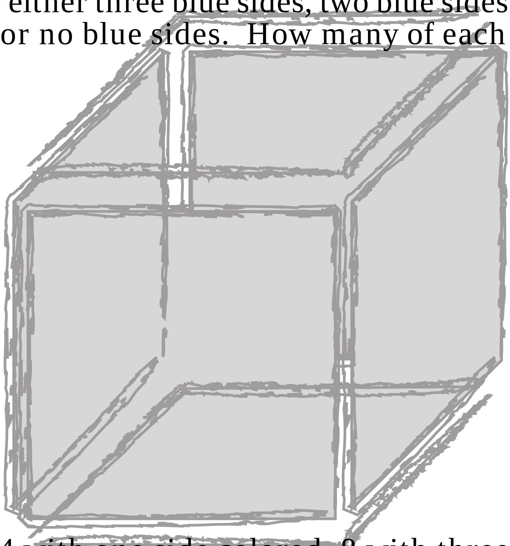
Answer

18. The German has the fish.



Question

A solid, four-inch cube of white plastic is coated with blue paint on all six sides. Then the cube is cut into smaller one-inch cubes. These new one-inch cubes will have either three blue sides, two blue sides, one blue side, or no blue sides. How many of each will there be?

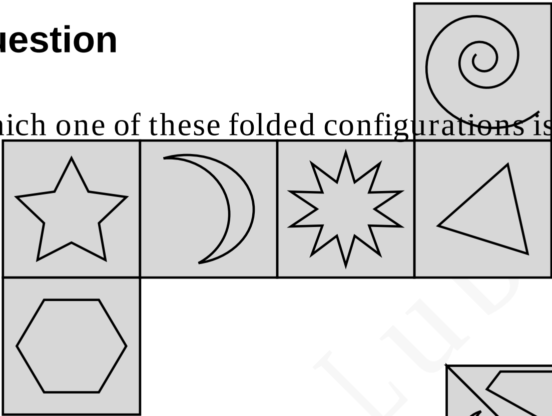


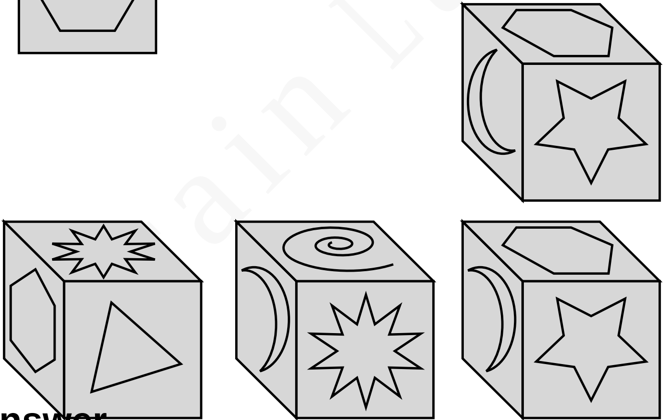
Answer

There are 24 with one side colored, 8 with three sides colored, 24 with two sides colored, and 8 with no sides colored.

Question

Which one of these folded configurations is correct?

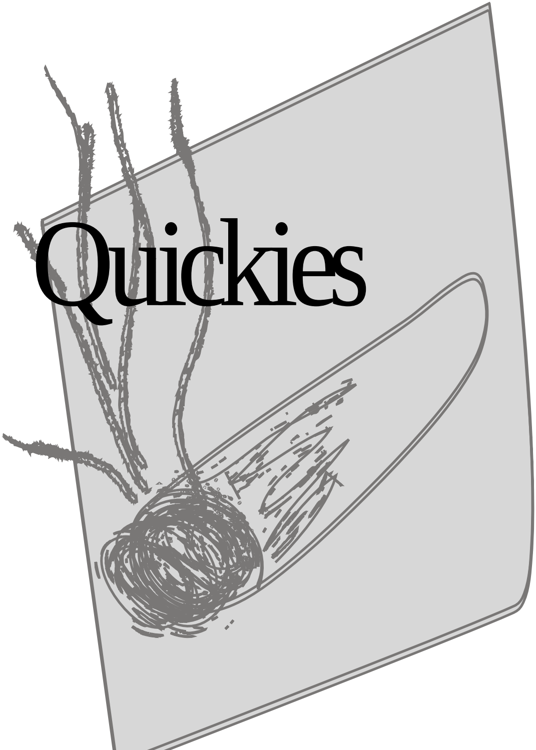




Answer

The cube in a row by itself.

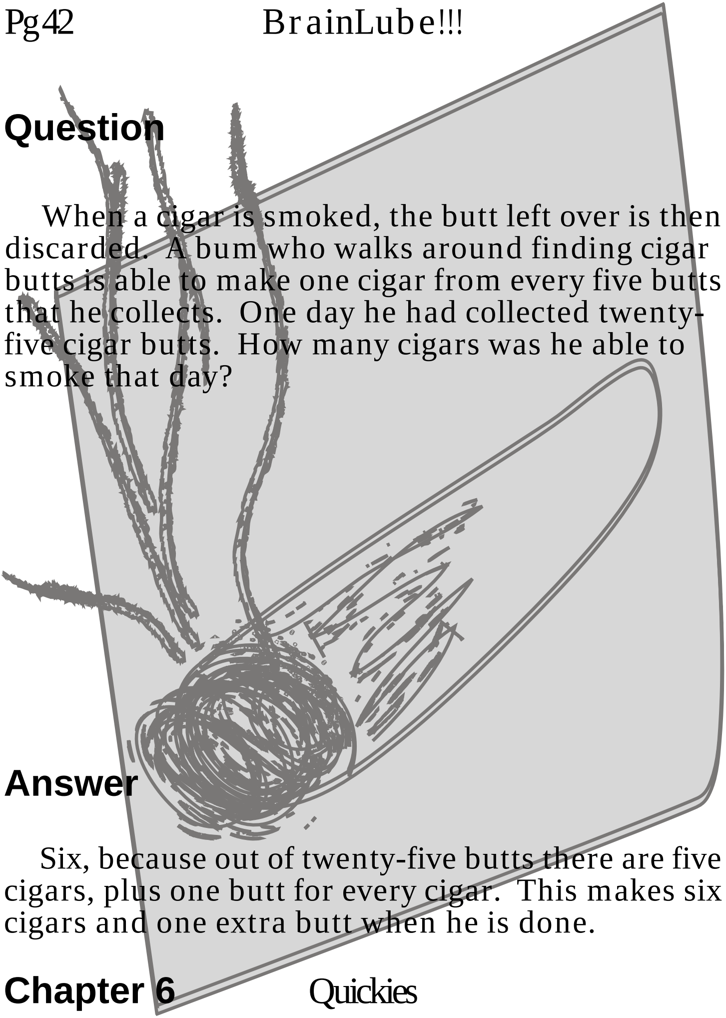
Chapter 6



Quickies

Question

When a cigar is smoked, the butt left over is then discarded. A bum who walks around finding cigar butts is able to make one cigar from every five butts that he collects. One day he had collected twenty-five cigar butts. How many cigars was he able to smoke that day?



Answer

Six, because out of twenty-five butts there are five cigars, plus one butt for every cigar. This makes six cigars and one extra butt when he is done.

Question

What gets wetter and wetter the more it dries?

Answer

A towel.

Question

What goes up and down the stairs without moving?

Answer

A banister.

Question

What can you catch but not throw?

Answer

A cold.

Question

Is there a fourth of July in England?

Answer

Yes, itís just not a holiday.

Question

You are in Antarctica and there is nothing around for miles except for a log cabin about fifty feet in front of you. You are very cold and all that you have is one match. You get to the cabin and inside you find a gas stove, an oil lamp, and some kindling. What do you light first?



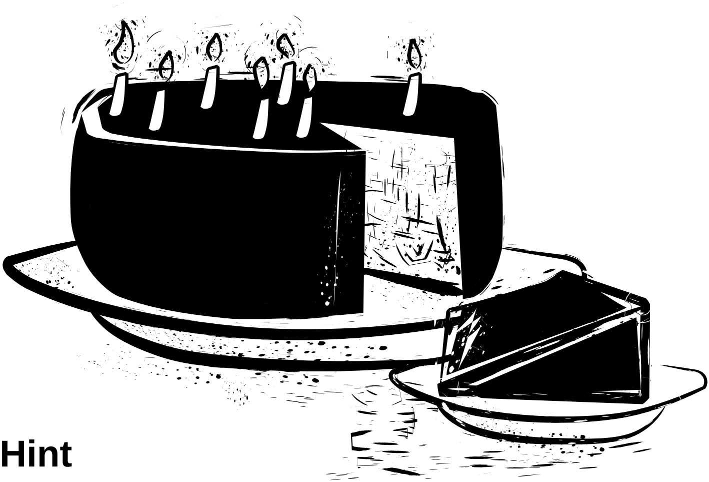
Answer

The match

Question

Itís your birthday and you have a cake. There are eight people at your party.

How do you cut eight equal pieces with only three straight cuts?

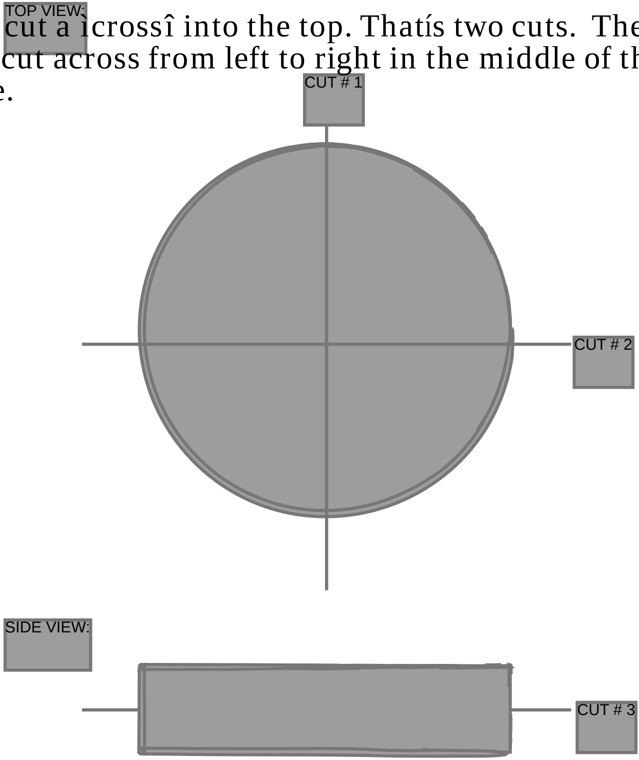


Hint

This cake has no icing.

Answer

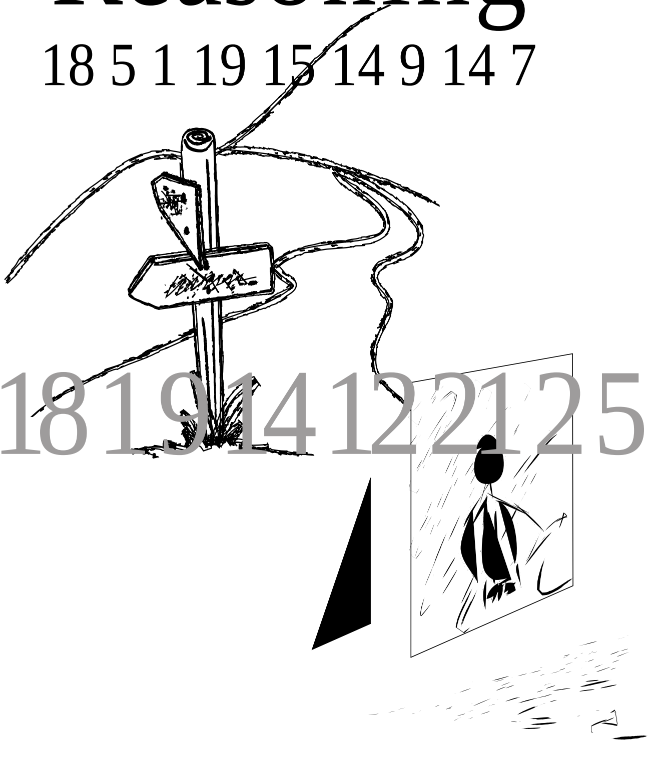
You cut a ìcrossî into the top. Thatís two cuts. Then you cut across from left to right in the middle of the cake.



Chapter 7

Reasoning

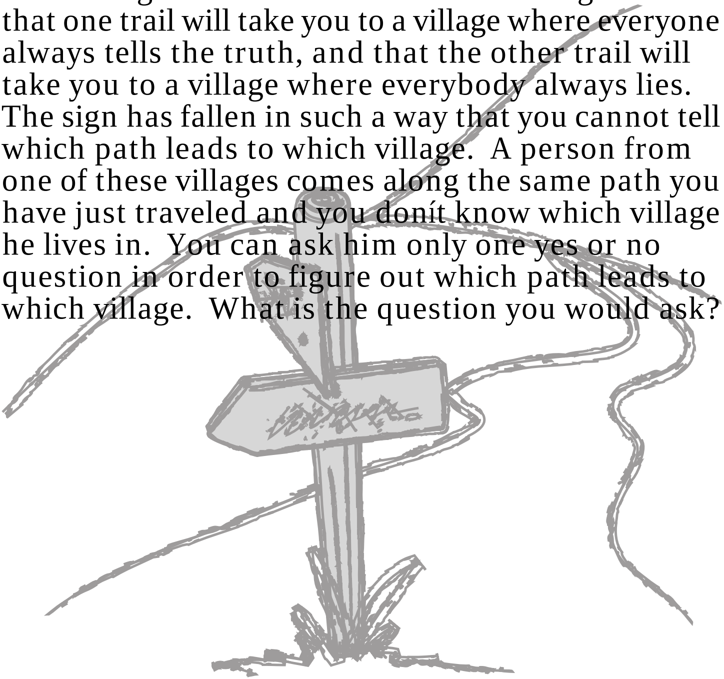
18 5 1 19 15 14 9 14 7



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Question

Traveling down a path, you stop at a fork in the trail. A sign has fallen at the fork. The sign shows that one trail will take you to a village where everyone always tells the truth, and that the other trail will take you to a village where everybody always lies. The sign has fallen in such a way that you cannot tell which path leads to which village. A person from one of these villages comes along the same path you have just traveled and you donít know which village he lives in. You can ask him only one yes or no question in order to figure out which path leads to which village. What is the question you would ask?



Hint

The man is definitely from one of the villages.

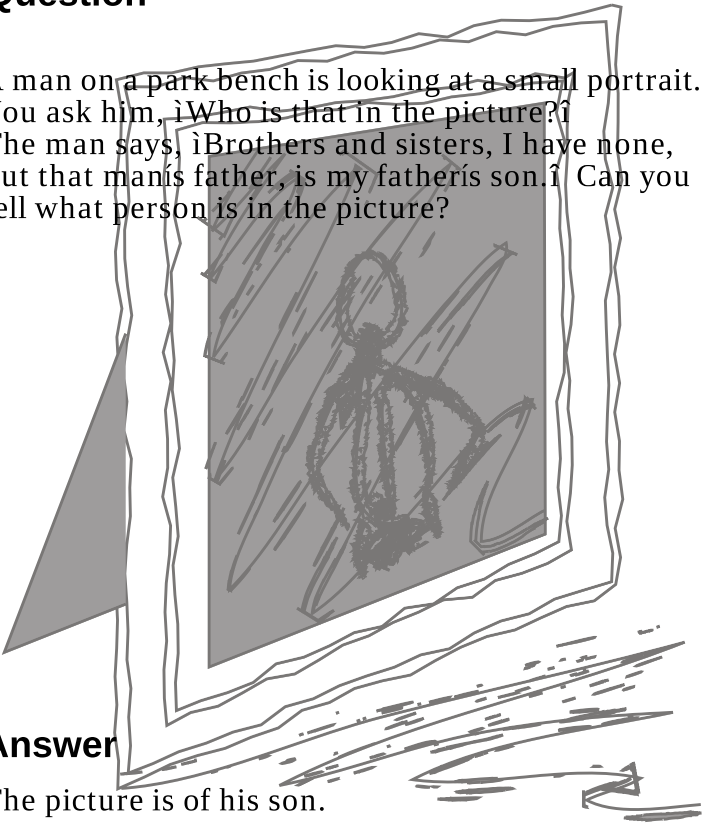
Answer

Point to either village and ask the man, ìAre you from this land?î If the man is a liar and you are pointing to the land of lies, he will tell you, ìNoî. If you ask the same question to the truth teller he will also tell you, ìNoî.
By that same logic, if you by chance point to the land of truth, the liar will say, ìYesî, and so will the truth teller.

So with that question, ìYesî is the land of truth, and ìNoî is the land of lies.

Question

A man on a park bench is looking at a small portrait. You ask him, ìWho is that in the picture?î
The man says, ìBrothers and sisters, I have none, but that manís father, is my fatherís son.î Can you tell what person is in the picture?



Answer

The picture is of his son.

Chapter 8
Brain Lube



Question

Years ago, to puzzle his friends, a scientist gave one of four containers containing blue and/or yellow marbles to each of the friends; Tom, Dick, Harry, and Larry. There were 3 marbles in each container, and the number of blue marbles was different in each one. There was a piece of paper in each container telling which color marbles were in that container, but the papers had been mixed up and were ALL in the wrong containers. He then told all of his friends to take 2 marbles out of their container, read the label, and then tell him the color of the third marble.

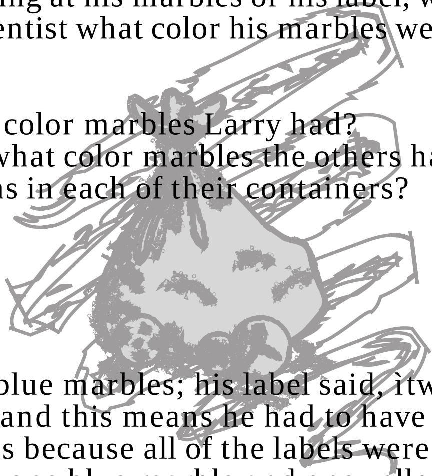
So Tom took two blue marbles out of his container and looked at the label. He was able to tell the color of the third marble immediately.

Dick took 1 blue marble and 1 yellow marble from his container. After looking at his label he was able to tell the color of his remaining marble.

Harry took 2 yellow marbles from his container. He looked at the label in his container, but could not

Question

tell what color the remaining marble was. Larry, without even looking at his marbles or his label, was able to tell the scientist what color his marbles were.



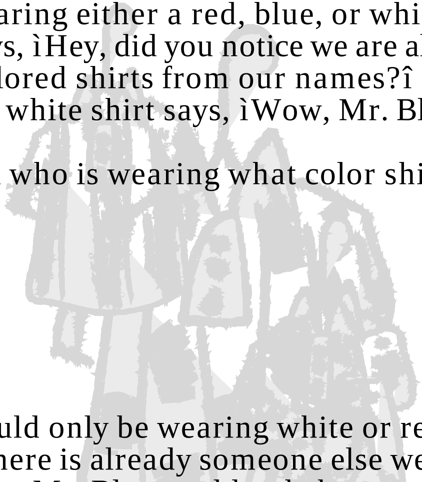
Can you tell what color marbles Larry had?
Can you also tell what color marbles the others had, and what label was in each of their containers?

Answer

Tom took two blue marbles; his label said, ìtwo blue one yellowî, and this means he had to have three blue marbles because all of the labels were wrong. Dick took one blue marble and one yellow marble; his label said, ìone blue and two yellowsî, so he had to have two blues and one yellow. Harry did not know what he had because he saw two yellow marbles and the label said, ìthree blueî. Larry knew what he had because he knew what was left, two yellow marbles and one blue marble.

Question

At a restaurant downtown, Mr. Red, Mr. Blue, and Mr. White meet for lunch. Under their coats they are wearing either a red, blue, or white shirt. Mr. Blue says, ìHey, did you notice we are all wearing different colored shirts from our names?î The man wearing the white shirt says, ìWow, Mr. Blue, thatís right!î
Can you tell who is wearing what color shirt?



Answer

Mr. Blue could only be wearing white or red and we know that there is already someone else wearing the white shirt so Mr. Blue could only be wearing the red shirt.
Mr. White could have only been wearing a blue or a red shirt, and red is already taken, so Mr. White is wearing a blue shirt.
Mr. Red now has to be wearing a white shirt.

Question

Three sisters are identical triplets. The oldest by minutes is Sarah, and Sarah always tells anyone the truth. The next oldest is Sue, and Sue always will tell anyone a lie. Sally is the youngest of the three. She sometimes lies and sometimes tells the truth.

Victor, an old friend of the familyís, came over one day and he didnít know who was who, since the triplets were very young the last time he had seen them. To tell them apart he asked each of them one question.

Victor asked the sister that was sitting on the left, ìWhich sister is in the middle of you three?î and the answer he received was, ìOh, thatís Sarah.î

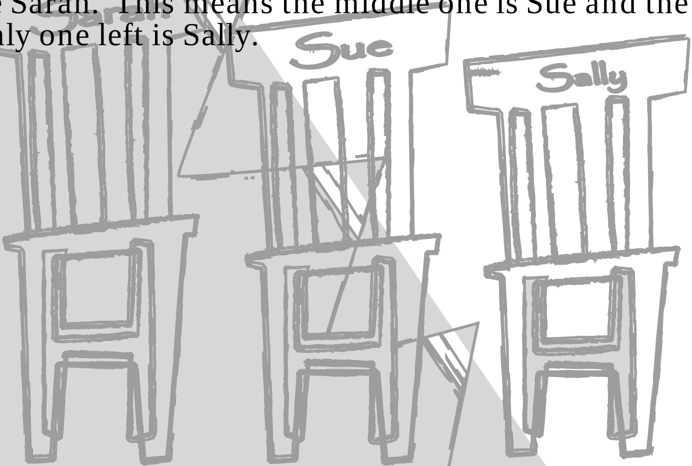
Victor then asked the sister in the middle, ìWhat is your name?î The response given was, ìIím Sally.î

Victor turned to the sister on the right, then asked, ìWho is that in the middle?î The sister then replied, ìShe is Sue.î

This confused Victor; he had asked the same question three times and received three different answers. Who was who?

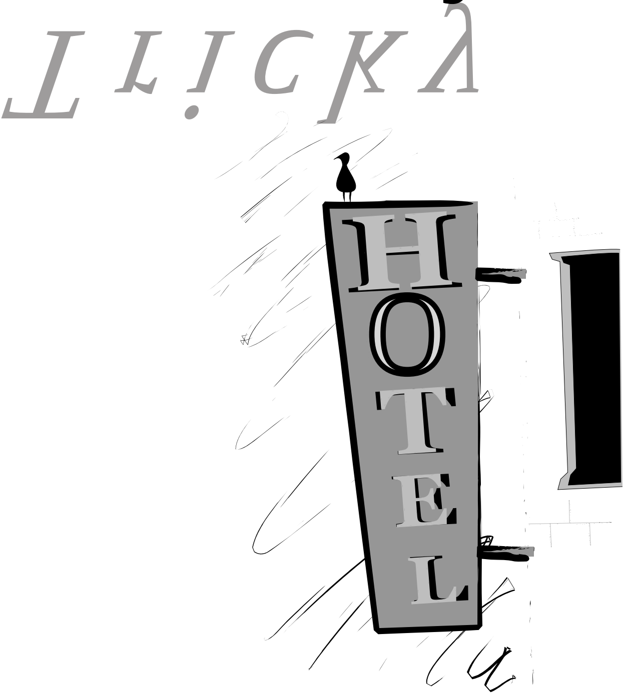
Answer

The first one cannot be Sarah, because that would make the first one a liar. The second one cannot be Sarah for the same reason. So, the third sister must be Sarah. This means the middle one is Sue and the only one left is Sally.



Chapter 9

Tricky



Question

Three men go to an inexpensive hotel to stay the night. The innkeeper tells them that each room is thirty dollars per night. All three men decide to rent one room together, each paying ten dollars. The men are led to their room by the bellhop. Later on, the innkeeper finds that he has over priced the room by five dollars so he asks the young bellhop to go upstairs and return the five dollars to the men. As the bellhop is going up the stairs, he realizes that the five dollars cannot be split evenly between three men. He decides to give one dollar to each man and keep two dollars for himself. The situation is now, that the men have paid nine dollars each, added together that equals twenty-seven dollars. The bellhop has two dollars, which makes twenty-nine dollars. Where did the thirtieth dollar go?

Answer

There are false statements in the question. The simple truth is that the men did not get two dollars back! The men ended up paying twenty-seven dollars for the room; if the bellhop gave them back the other two dollars they would have paid twenty-five.

Question

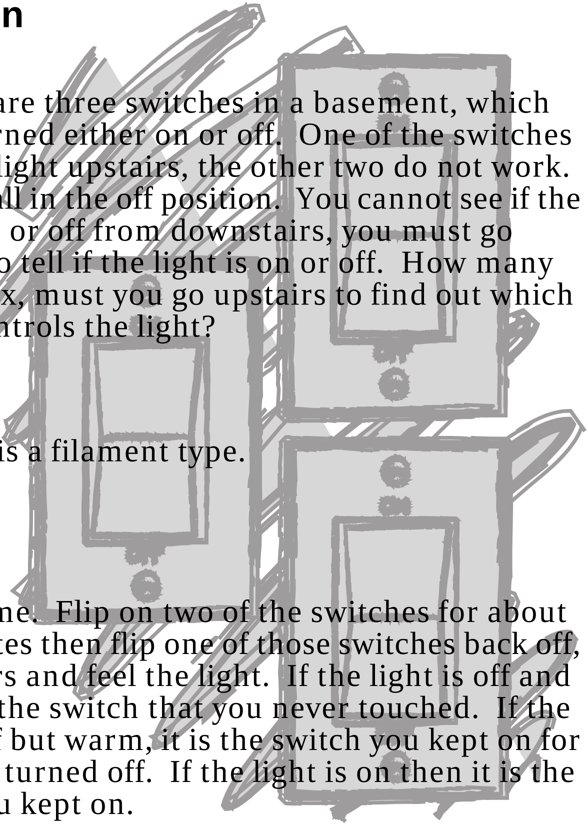
There are three switches in a basement, which can be turned either on or off. One of the switches is for the light upstairs, the other two do not work. They are all in the off position. You cannot see if the light is on or off from downstairs, you must go upstairs to tell if the light is on or off. How many times, max, must you go upstairs to find out which switch controls the light?

Hint

The light is a filament type.

Answer

One time. Flip on two of the switches for about five minutes then flip one of those switches back off, go upstairs and feel the light. If the light is off and cool, it is the switch that you never touched. If the light is off but warm, it is the switch you kept on for a bit then turned off. If the light is on then it is the switch you kept on.



Question

Two fathers took their sons fishing. Each man and son caught one fish, but when they returned to camp there were only 3 fish. How could this be?

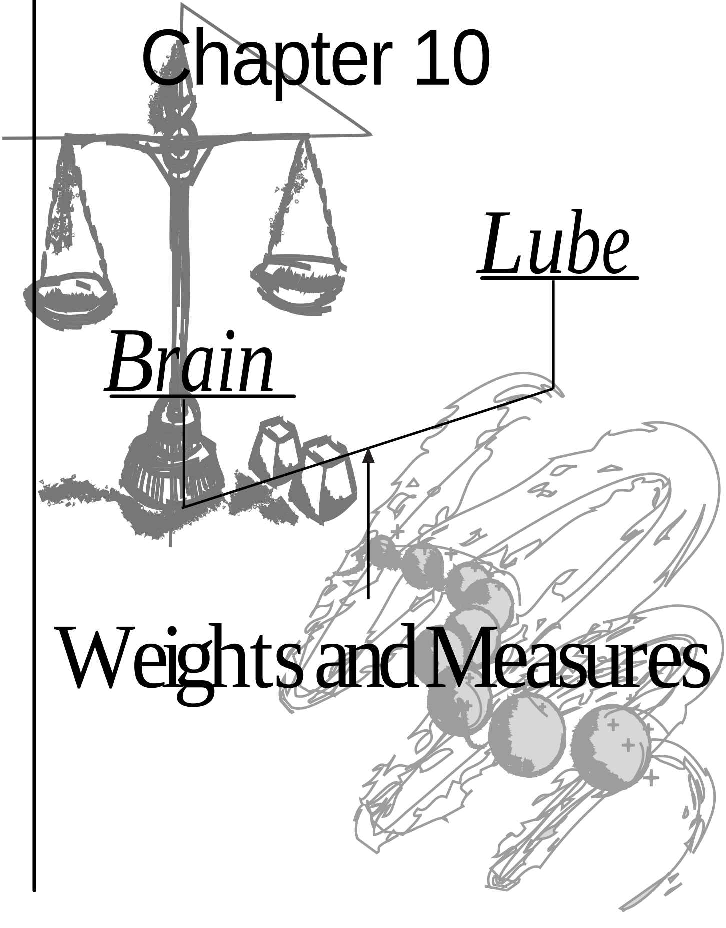
Hint

None of the fish were eaten, lost, or thrown back.

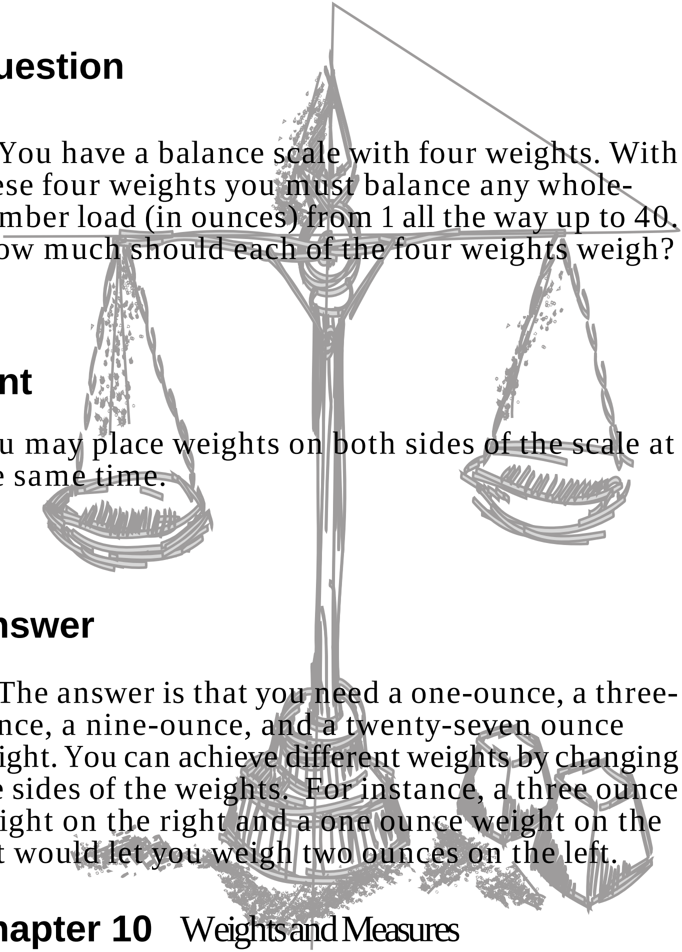
Answer

There were only three people. The son, his father, and his grandfather.

Chapter 10



Weights and Measures



Question

You have a balance scale with four weights. With these four weights you must balance any whole-number load (in ounces) from 1 all the way up to 40. How much should each of the four weights weigh?

Hint

You may place weights on both sides of the scale at the same time.

Answer

The answer is that you need a one-ounce, a three-ounce, a nine-ounce, and a twenty-seven ounce weight. You can achieve different weights by changing the sides of the weights. For instance, a three ounce weight on the right and a one ounce weight on the left would let you weigh two ounces on the left.

Question

There are nine pearls in your possession. Eight of them are real pearls, and one of them is a fake pearl. The eight real ones all weigh exactly the same. However, the fake pearl weighs slightly less than the real ones. With no more than two uses of a balance scale, how can you find the fake pearl?

Hint

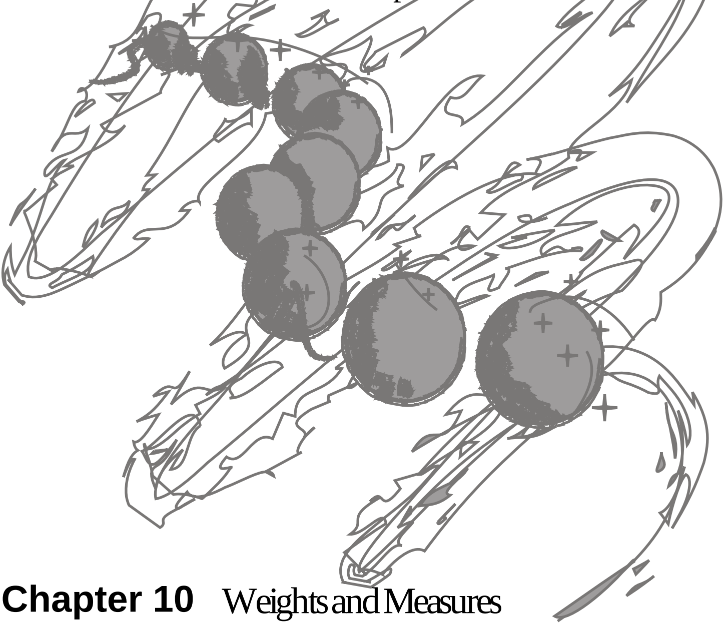
The difference in weight is so minute that you must use the scale.
The only way to decipher the fake pearl is by weight.

Answer

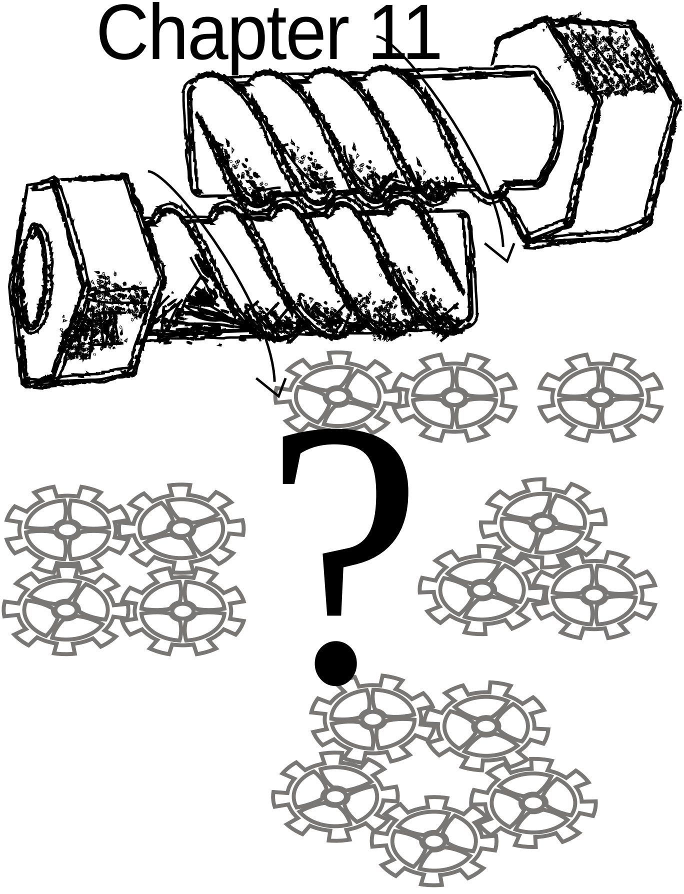
Place three pearls on one side and three pearls on the other side, if the scale remains balanced then the fake pearl is one of the three you left out. If the scale becomes off balance then the raised pile is the lightest, and that means that the fake pearl is in that set of three.

Answer

Take the set of three with the fake pearl in it and place (on a clean scale) one pearl on one side of the scale and one on the other side of the scale, leaving one out. Again, if the scale is even then the fake pearl is the one you left out, and if the scale is unbalanced then the raised pearl is the fake one.

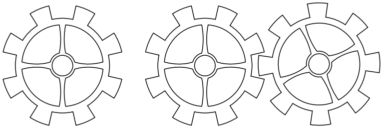


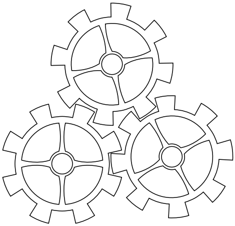
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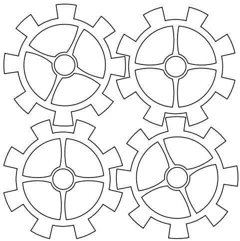


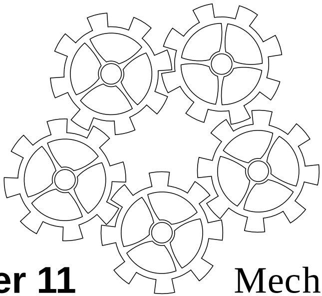
Question

Which two of these configurations makes it impossible for the gears to make a single rotation?



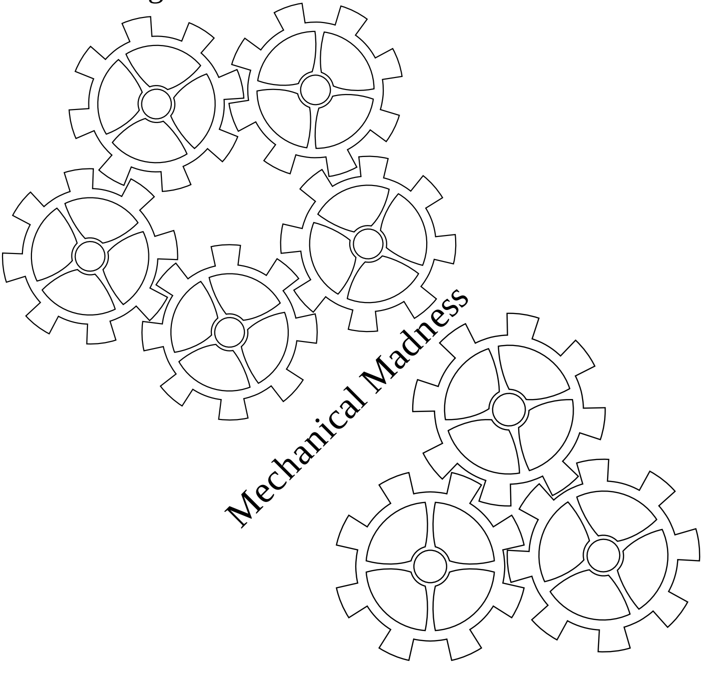






Answer

The configuration with five gears and the configuration with three gears will not be able to make a single rotation.



Question

There are five gears connected in a row, the first one is connected to the second one, the second one is connected to the third one, and so on. If the first gear is rotating clockwise what direction is the fifth gear turning?

Answer

Clockwise.

Question

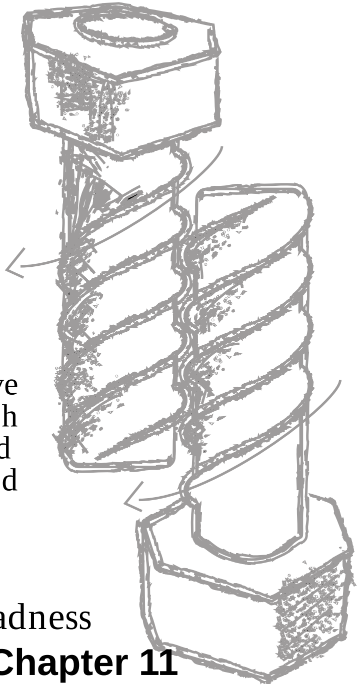
How much faster would the last gear be if the second gear was twice the size of the first gear, and all the other gears were the same size as the first gear?

Answer

The last gear would be the same speed.

Question

If both of the screws are turning at the same speed and same direction on either side will the screws drive away from each other, drive toward each other, or remain the same distance from each other?

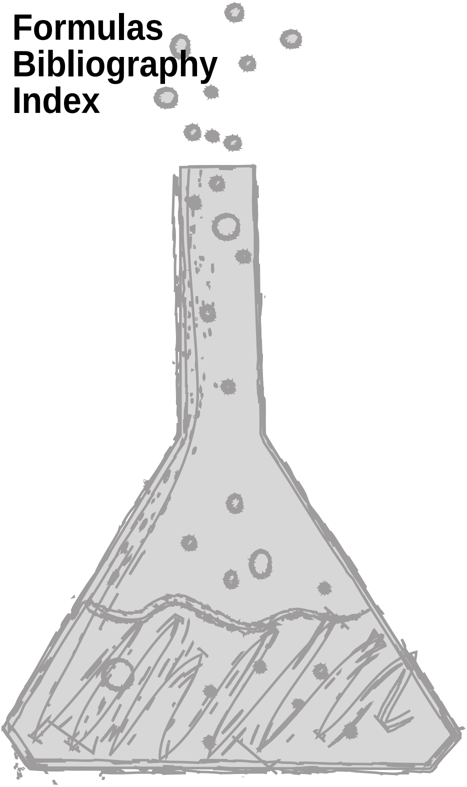


Answer

The screws will niether drive toward nor away from each other. Everything screwed in from one screw is screwed out from the other screw.

Chapter 12

Formulas
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Formulas

The Math of a Circle
Diameter = The measurement across the circle.
Radius = Ω the diameter.
Pi = 3.14159265358979323846264338832795
Circumfrence = Diameter * Pi
Area of a circle = (Pi * D^2)/4
D = Diameter
RPM
Revolutions per minute = N / T
N = Number of rotations.
T = Time in Minutes.

Relative Centrifugal Force
G = 1.119 * 10^-5 * RPM^2 * Radius
G = Relative Centrifugal Force in G-Forces.
Radius = Ω the diameter in centimeters.

Linear Speed on a Rotating Disk
S = Pi(Radius * 2) * RPM
S = Linear Speed in RPMs

Volume of a Cylinder
V = Pi * R^2 * H
V = Volume

Formulas

R = Radius
H = Height

Volume of a Circular Cone
V = (1/3)Pi(r^2 + rR + R^2)H
V = Volume
r = Small Radius
R = Large Radius
H = Height

Acceleration
A = (Vf ñ Vo)/t
A = Acceleration
Vf = Final Velolcity
Vo = Original Velocity
t = Time

Final Velocity
Vf = Vo + A(t)
A = Acceleration
Vf = Final Velolcity
Vo = Original Velocity
t = Time

Formulas

Kinetic Energy
KE = (M * V^2)/2
KE = Energy
M = Mass in Kilograms
V = Velocity in Meters per Second
Simple Gear Rotation Calculations
IE. Two gears meshed together.

R = Na/Nb
R = Number of revolutions gear ìBî will make per one revolution of gear ìAî.
Na = Number of teeth in gear ìAî.
Nb = Number of teeth in gear ìBî.

Simple Gear Law
(Number of turns of GEAR1 * Teeth in GEAR1)

is always equal to

(Number of turns of GEAR2 * Teeth in GEAR2)

Gear Ratio =
Turns of output gear
Turns of input gear

Formulas

Numerical Center Point

C = (En ñ Sn) / 2 + Sn

C = Center point between number set

Sn = Start Number

En = End Number

Ohmís Law

E = I * R

E = Voltage in Volts

I = Current in Amps

R = Resistance in Ohms

Linear Spring Energy

$F_s = K_s X$

F_s = Force applyed in newtons

X = Compression in meters

K_s = Stiffness constaint in newton-meters

Simple Motor Math

HP = ((VA)/(100E))/746

V = Voltage

A = Amperage

VA = Power in Watts

E = % Efficiency

Formulas

746 Watts = 1HP
HP = Horse Power

Motor heat is proportional to
$Current^2$ * Resistance

Series Resistance
$R_T = R_1 + R_2 + R_3$
R_T = Resistance in series
R_{123} = Individual resistor values

Parallel Resistance
$R_T = (R_1 * R_2) / (R_1 + R_2)$
R_T = Resistance in parallel
R_{123} = Individual resistor values

Formulas

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